



information

Freemont, Calif., June 15, 2006

Press Release

Air Liquide's Balazs Analytical Services announces a new breakthrough in trace analysis to part per quadrillion (ppq) levels

Balazs Analytical Services announces quantitative techniques that provide parts per quadrillion (ppq) trace analysis. Analysis at ppq levels, where 1 ppq is equivalent to 1 in a million billions, becomes critical as technology nodes decrease to 90nm and below.

As semiconductor technology advances, increased attention to the **purity** of manufacturing material is required. To more accurately quantify trace concentrations of contaminants, Balazs Analytical Services, a division of Air Liquide Electronics U.S. LP, has introduced **PPQ Analysis**, a new analytical technique for **accurate quantification of ultra-trace metal concentrations** in water and process chemicals down to **part per quadrillion (ppq) levels**.

Rich Jahr, president of Air Liquide Electronics U.S. LP, remarked, ***"Our capability to deliver this added dimension of quality creates substantive value for customers by improving their manufacturing process and ensuring greater productivity and profitability."***

The ability to provide **accurate and routine PPQ Analysis** results from a multi-year R&D effort to develop and incorporate **ultra-clean processes** throughout the sample lifetime. Special care begins at initial sampling and sample preparation and continues through the final blank and sample analysis by Inductively Coupled Plasma Mass Spectrometry (ICP-MS).

Alex Tremblot, general manager of Balazs explained, ***"As the industry moves to 90nm production and more advanced technology nodes, it is experiencing problems not observed before. Understanding contamination in ultrapure water and high purity cleaning chemistries is becoming critical. Balazs has developed true quantitative techniques to identify contaminants at ppq levels. PPQ Analysis has already been used to quantify low-level Ni and Ca contamination to help resolve yield issues."***

To perform **PPQ Analysis**, a **self-cleaning sampling** device is used to take point-of-use samples. The samples are then prepared and **analyzed in duplicate** to ensure **quality control** and demonstrate the **repeatability** of the method. Additionally, each sample undergoes ICP-MS analysis with a proprietary system to **lower matrix effects**. The final indications of **method surety** are spike recoveries performed at ppq concentrations resulting in the 90 to 100 percent range, confirming that the data is indeed real.

Balazs' **PPQ Analysis** has been **validated** by the leading semiconductor industry organization and is currently used in production by several industry leaders.

Balazs Analytical Services, a division of Air Liquide Electronics U.S. LP, operates ISO 17025 certified laboratories that specialize in identifying ultra-low level contamination. Balazs' expertise covers solids, liquids and gases used in the electronics and other high-tech industries. With every analysis, Balazs brings over 30 years of experience to help engineers control their process. Balazs laboratories are located in Dallas, Texas; Fremont, Calif.; Fishkill, N.Y.; and Paris, France.

With 2,200 employees, Air Liquide Electronics recorded sales of 855 million euros in 2005 (9% of the Group's Gas and Services sales). Air Liquide Electronics supplies ultra-pure gases, specialty gases, related equipment and customized services. To enhance its proximity to the rising semiconductor market in Asia, the Group Electronics management is now based in Tokyo.

Present in more than 70 countries, **Air Liquide** is the world leader in industrial and medical gases and related services. The Group offers **innovative solutions** based on constantly enhanced **technologies**. These solutions, which are consistent with Air Liquide's commitment to **sustainable development**, help to protect life and enable our customers to manufacture many indispensable everyday products. Founded in 1902, Air Liquide has nearly 36,000 employees. The Group has successfully developed a long-term relationship with its shareholders built on **trust** and **transparency** and guided by the principles of **corporate governance**. Since the publication of its first consolidated financial statements in 1971, Air Liquide has posted **strong and steady earnings growth**. Sales in 2005 totalled 10,435 million euros, with sales outside France accounting for almost 80%. Air Liquide is listed on the Paris stock exchange and is a component of the CAC 40 and Eurostoxx 50 indices (ISIN code FR 0000120073).

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